FREQUENCY DISCRIMINATOR TEST PANEL

578Q-1

INSTRUCTION BOOK

COLLINS RADIO COMPANY

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(C) Date placed in service
(D) Number of hours of service
(E) Nature of trouble
(F) Cause of trouble if known
(G) Part number (9 or 10 digit number) and name of part thought to be causing trouble
(H) Item or symbol number of same obtained from parts list or schematic
(I) Collins number (and name) of unit subassemblies involved in trouble
(J) Remarks

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Service Division
Cedar Rapids, Iowa

INFORMATION NEEDED:

(A) Quantity required
(B) Collins part number (9 or 10 digit number) and description
(C) Item or symbol number obtained from parts list or schematic
(D) Collins type number, name and serial number of principal equipment
(E) Unit subassembly number (where applicable)

FREQUENCY DISCRIMINATOR TEST PANEL

578Q-1

INSTRUCTION BOOK

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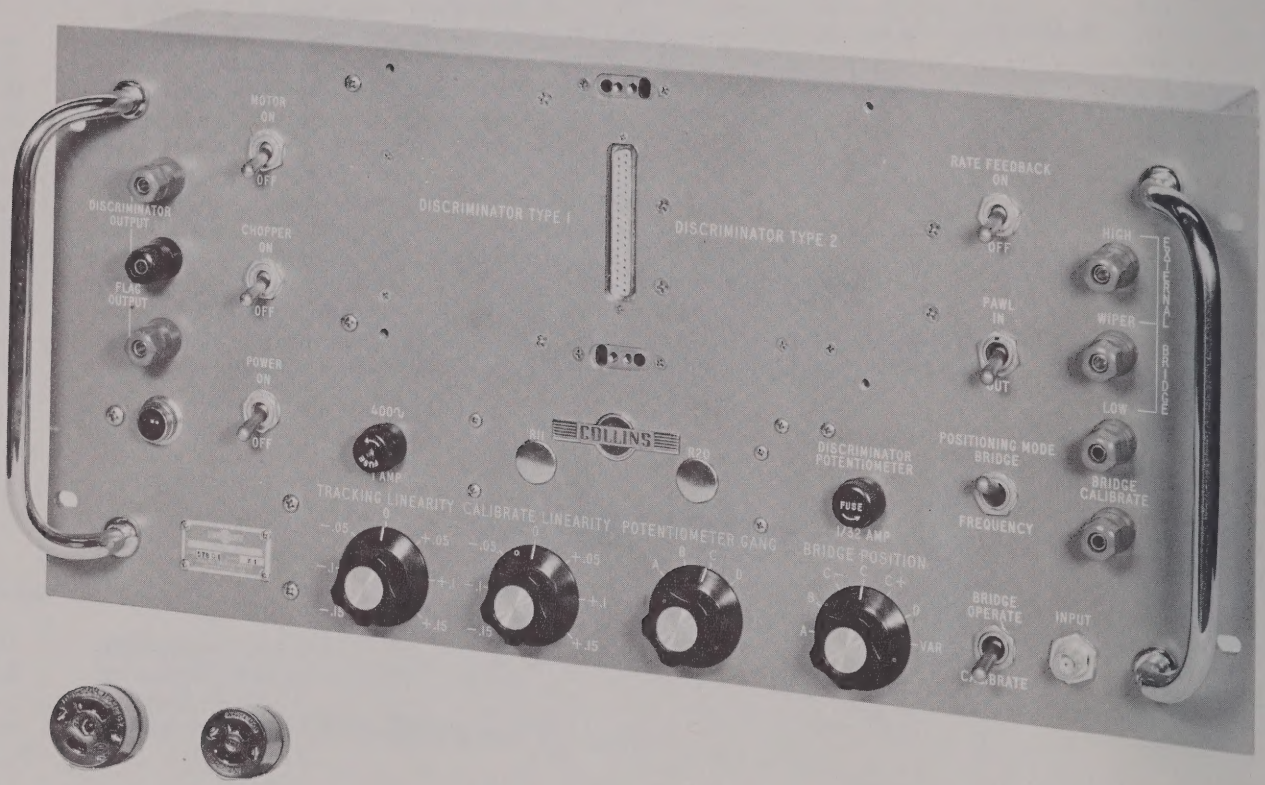


Figure 1-1. Frequency Discriminator Test Panel 578Q-1

SECTION I
GENERAL DESCRIPTION

1.1 PURPOSE OF THE 578Q-1.

Frequency Discriminator Test Panel 578Q-1, Collins part number 522-2066-00, is to be used for testing and aligning discriminators types 1 and 2, Collins part numbers 544-0058-00 and 544-0059-00, respectively. These discriminators are modules of Computer/Tracker 562F-1B, a component of Collins Doppler Radar Navigation System DN-101.

1.2 EQUIPMENT SUPPLIED AND EQUIPMENT NOT SUPPLIED.

Table 1-1 lists the equipment supplied. Table 1-2 lists additional equipment required but not supplied. Suitable substitutes for equipments listed in table 1-2 may be used.

TABLE 1-1
EQUIPMENT SUPPLIED

EQUIPMENT	COLLINS PART NUMBER
Frequency Discriminator Test Panel	522-2066-00
Connector P9	368-0015-00
Connector P10	368-0010-00

TABLE 1-2
EQUIPMENT REQUIRED BUT NOT SUPPLIED

EQUIPMENT	EQUIPMENT TYPE OR COLLINS PART NUMBER
Doppler Tracker Signal Simulator 476F-1A	522-2540-00
D-C Vacuum-Tube Voltmeter	Heathkit V7A
Microvoltmeter	Kintel 202B
A-C Vacuum-Tube Voltmeter	Triplett 630

NOTE

A signal generator substituted for the 476F-1A must be capable of delivering 1.0-volt input to the 578Q-1 at the following frequencies and accurate to within the tolerance given:

155.500 kc ±1.0 cps
158.875 kc ±1.0 cps
162.250 kc ±1.0 cps

1.3 CHARACTERISTICS OF THE 578Q-1.

Modes of Operation	Two modes of servo operation; frequency positioning and bridge.
Type of Service	Continuous
Dimensions	19 x 8-21/32 x 6-1/2 inches
Weight	7 lb
Type Mounting	Rack panel construction
Service Conditions	Shop ambient
Power Source	115 volts ±10 percent, 380-420 cps
	27.5 volts ±10 percent, d-c
Input Signal	From Doppler Signal Simulator 476F-1A, or equivalent
Controls	Power, ON-OFF
	CHOPPER, ON-OFF
	RATE FEEDBACK, ON-OFF
	PAWL, IN-OUT
	POTENTIOMETER GANG selector
	Servo MOTOR, ON-OFF
	TRACKING LINEARITY
	CALIBRATE LINEARITY
	BRIDGE POSITION selector
	POSITIONING MODE, BRIDGE-FREQUENCY
	BRIDGE, OPERATE-CALIBRATE

SECTION II
INSTALLATION

2.1 UNPACKING.

Unpack the 578Q-1 with care, and inspect the unit for possible shipping damage. If a claim for damage is filed with the transportation agency, it is advisable to retain the shipping cartons.

2.2 BENCH TEST.

The 578Q-1 should be in operating condition when received. If the performance of the unit is unsatisfactory, perform the tests outlined in section V.

2.3 MOUNTING AND CABLING.

The 578Q-1 is designed for mounting in a 19-inch rack panel. The unit should be secured to the rack with four mounting screws and four washers. The 578Q-1 may be set up as an independent unit without rack mounting, if desired. Suitable power connectors and cables are to be connected to the chassis-mounted connectors. See figure 2-1 for outline and mounting dimensions and power connector types and location.

2.4 INITIAL ADJUSTMENTS.

Remove and inspect the two fuses mounted on the front panel. Ensure that they are the proper value and continuous. Turn the POWER and CHOPPER switches to OFF position prior to connecting the power sources.

2.5 CABLE FABRICATION

Fabricate power cables for the 578Q-1 incorporating the connectors furnished (see table 1-1). Use applicable connectors on the free ends of the cables.

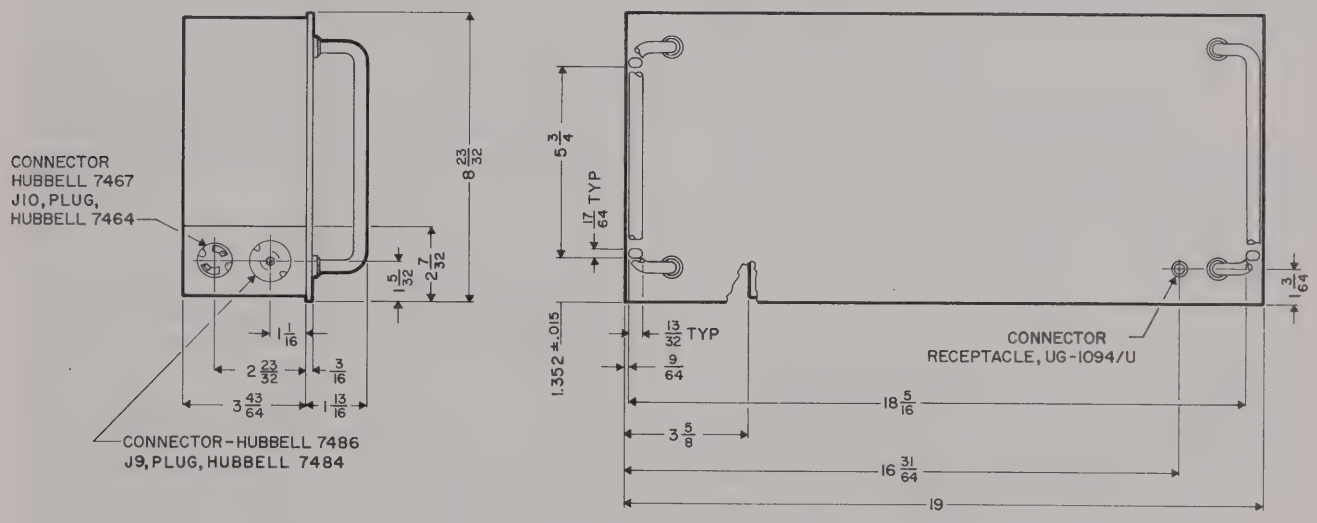


Figure 2-1. Outline and Mounting Dimensions, 578Q-1

SECTION III
OPERATION

3.1 CONTROLS.

3.1.1 MOTOR.

The MOTOR OFF-ON switch is S6 on the schematic diagram, figure 7-1. This switch opens and closes the servo motor positioning circuit of the discriminator under test.

3.1.2 CHOPPER.

The CHOPPER OFF-ON switch is S2 on the schematic diagram, figure 7-1. This switch opens and closes the solenoid circuit of the chopper G1 within the 578Q-1.

3.1.3 POWER.

The POWER OFF-ON switch is S1 on the schematic diagram, figure 7-1. This switch opens and closes the primary circuit of the power transformer, T1.

3.1.4 TRACKING LINEARITY.

The TRACKING LINEARITY control is R14 on the schematic diagram, figure 7-1. This control is used during discriminator module calibration tests, see paragraph 3.2.

3.1.5 CALIBRATE LINEARITY.

The CALIBRATE LINEARITY control is R17 on the schematic diagram figure 7-1. This control is used during discriminator module calibration tests, see paragraph 3.2.

3.1.6 POTENTIOMETER GANG.

The POTENTIOMETER GANG selector is S5 on the schematic diagram, figure 7-1. This selector is used to choose a single potentiometer of the discriminator module for testing and/or calibrating.

3.1.7 BRIDGE POSITION.

The BRIDGE POSITION selector is S8 on the schematic diagram, figure 7-1. This selector is used to choose bridge components within the 578Q-1 for discriminator module alignment.

3.1.8 BRIDGE OPERATE-CALIBRATE.

The BRIDGE OPERATE-CALIBRATE switch is S9 on the schematic diagram, figure 7-1. The CALIBRATE position is used while calibrating the 578Q-1 against an external standard. See section V. The OPERATE position is used during discriminator module testing and aligning.

3.1.9 POSITIONING MODE.

The POSITIONING MODE switch is S7 on the schematic diagram, figure 7-1. This switch is used to select the servo motor control source, either the bridge network of the 578Q-1, or the discriminator of the discriminator module under test.

3.1.10 PAWL.

The PAWL IN-OUT switch is S4 on the schematic diagram, figure 7-1. This switch opens and closes the circuit of the solenoid of L3, the pawl actuator, in the frequency discriminator module.

3.1.11 RATE FEEDBACK.

The RATE FEEDBACK switch is S3 on the schematic diagram, figure 7-1. This switch opens and closes the circuit for 400-cps current through the stator winding of the servo generator located within the frequency discriminator module under test.

3.2 DISCRIMINATOR MODULE TESTING.

a. Mount and secure the frequency discriminator module to the front panel of the 578Q-1 with the module captive mounting screws. Ensure that the 578Q-1 is connected to the proper power sources; see paragraph 1.3.

NOTE

Frequency discriminators type 1 and type 2 are keyed to mate only one way with the front panel of the 578Q-1. Refer to the silk screening on the front panel of the 578Q-1 for type 1 and type 2 orientation.

Frequency discriminators type 1 and type 2 each have a connector of type DC-37P which mates with type DC-37S connector which is mounted on the front panel of the 578Q-1.

b. Move the POWER switch of the 578Q-1 to ON position.

c. Connect one end of a coaxial cable to the RF IN/OUT connector located on the front of Doppler Tracker Signal Simulator 476F-1A, (see table 1-2). Connect the other end of the coaxial cable to the INPUT connector on the 578Q-1.

d. Position the FREQUENCY selector of the 476F-1A to 158.875.

e. Move the POWER switch on the 476F-1A to ON position.

f. Connect the d-c vtvm (see table 1-2) between the FLAG OUTPUT jack and ground on the 578Q-1.

g. Adjust the RF OUTPUT control on the 476F-1A to obtain 2.75 ±0.2 volts as indicated on the d-c vtvm of step f. above.

h. Position the controls of the 578Q-1 as follows:

POWER	ON
CHOPPER	ON
MOTOR	ON
RATE FEEDBACK	OFF
POSITIONING MODE	FREQUENCY
BRIDGE SWITCH	OPERATE
BRIDGE POSITION	C
POTENTIOMETER GANG	A

i. Hold the PAWL switch to IN position, and move the RATE FEEDBACK switch to ON position.

j. After three seconds, release the PAWL switch, and allow it to return to OUT position.

k. Connect the d-c microvoltmeter between the DISCRIMINATOR OUTPUT jack and ground.

l. Move the POSITIONING MODE switch to BRIDGE position.

NOTE

The indicator needle of the vtvm may oscillate slightly. This is a normal occurrence.

m. Adjust the CALIBRATE LINEARITY control to a null as indicated on the d-c vtvm of step k above. The null should occur with the CALIBRATE LINEARITY control between the limits of -.15 and +.15.

n. Position the POTENTIOMETER GANG selector to B.

o. Repeat step m above for each of the POTENTIOMETER GANG positions B, C, and D.

p. Return the POTENTIOMETER GANG selector to position A.

q. Position the FREQUENCY selector of the 476F-1A to 155.550.

r. Adjust the RF OUTPUT control of the 476F-1A to obtain 2.75 ±0.2 volts as indicated on the d-c vtvm.

s. Move BRIDGE POSITION selector to position B.

t. Adjust the TRACKING LINEARITY control to obtain a null as indicated on the d-c microvoltmeter. The null indication should occur with the TRACKING LINEARITY control between the limits of -.15 and +.15.

u. Move the POTENTIOMETER GANG to position B.

v. Repeat step v above with POTENTIOMETER GANG in each of the positions, B, C, and D.

w. Move the BRIDGE POSITION selector to position C. Move the FREQUENCY selector of the 476F-1A to the 158.875 position, and adjust the RF OUTPUT control to obtain -2.75 ±0.2 volts as indicated on the d-c vtvm.

x. Move the BRIDGE POSITION selector to C-, and record the magnitude and polarity of the indication on the d-c microvoltmeter.

y. Move the BRIDGE POSITION selector to C+, and observe the magnitude and polarity of the indication on the d-c microvoltmeter. The indication must be of opposite polarity and of a magnitude within ±0.1 volt d-c of the indication recorded in step u above.

z. Move the BRIDGE POSITION selector to position D.

aa. Move the FREQUENCY selector of the 476F-1A to 162.250 position.

ab. Adjust the RF OUTPUT control of the 476F-1A to obtain 2.75 ±0.2 volts indicated on the d-c vtvm.

ac. The indication on the d-c microvoltmeter should be 0 ±150 millivolt.

3.3 DISCRIMINATOR MODULE ALIGNMENT.

3.3.1 MECHANICAL ADJUSTMENT.

a. Remove the cover on the module, and secure the module to the 578Q-1.

b. Calculate the position of the CALIBRATE LINEARITY control as follows:

(1) If the NOTCH number is stamped on the gear plate (figure 3-1), subtract the number from 51.890, and set the CALIBRATE LINEARITY control to the difference.

(2) When the NOTCH number is not printed on the gear plate, use the percentage of voltage equal to 183.7 degrees of variable resistor shaft clockwise rotation which is recorded on the variable resistor case (figure 3-2). Subtract this value from 51.890, and set the CALIBRATE LINEARITY control to the difference.

c. Loosen the two setscrews on the collar (figure 3-2) which secure the stop wheel to the potentiometer shaft (figure 3-1). For fine adjustment, loosen the three screws that mount the pawl stop solenoid to the pawl stop solenoid plate (figure 3-1).

d. Hold PAWL switch to IN, insert a Bristo wrench to splined shaft at the end of the variable resistor, and turn until the pawl drops into the detent in the stop wheel (figure 3-2).

CAUTION

Pawl stop solenoid has a limited duty cycle. Do not operate solenoid longer than thirty seconds at a time. Allow a one-minute cooling period between each run cycle.

e. If the motor runs while holding the PAWL switch to IN, adjust the variable resistor shaft (using the Bristo wrench) or move solenoid until the motor stops or begins to oscillate. Position the variable resistor shaft as near as possible to the point where the motor reverses direction. Set MOTOR switch to OFF and the PAWL switch to OUT.

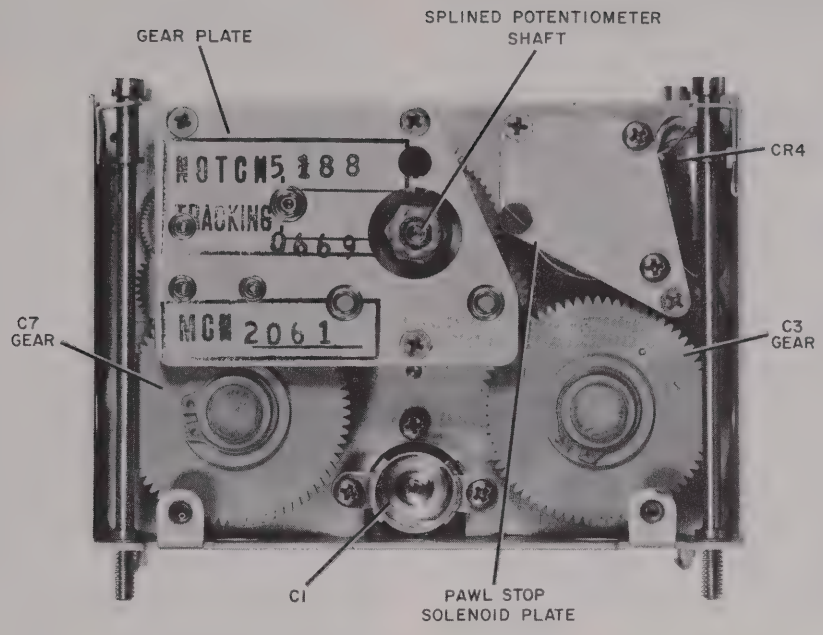


Figure 3-1. Frequency Discriminator Module (Type 1), End View Showing Gear Plates

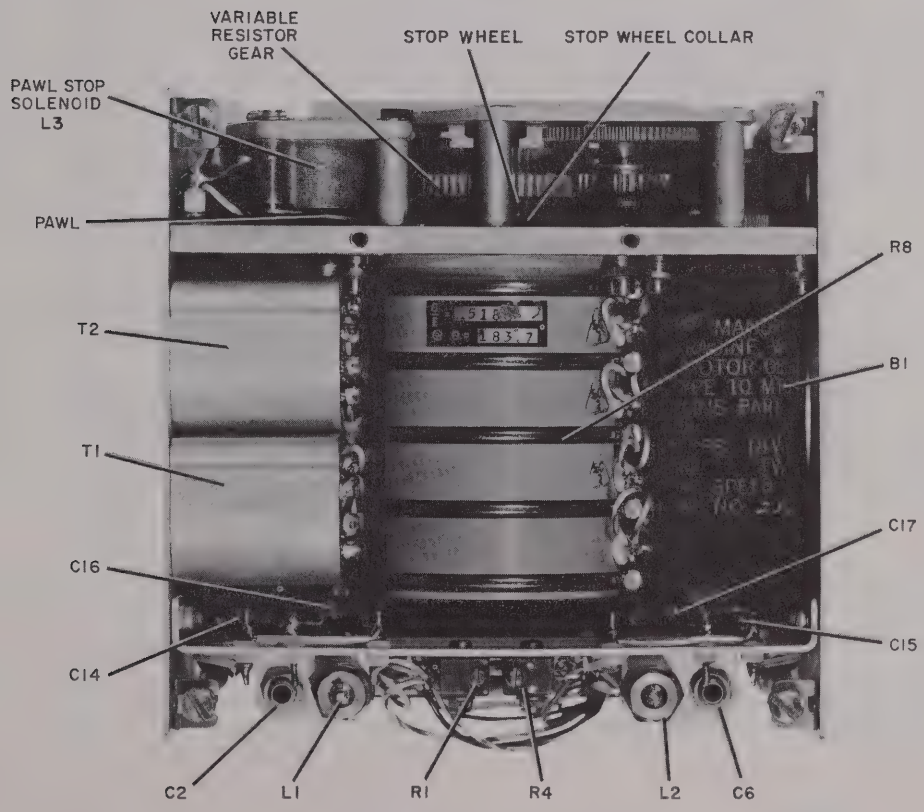


Figure 3-2. Frequency Discriminator Module (Type 1), Top View, Cover Removed

f. Tighten the two setscrews on the pawl stop wheel (figure 3-2) and the three screws on the pawl stop solenoid (figure 3-1).

CAUTION

Do not turn variable resistor gear (figure 3-2) when tightening setscrews.

g. Position BRIDGE POSITION selector to A and BRIDGE switch to CALIBRATE.

h. Rotate capacitor gear (C3, figure 3-1) in a counterclockwise direction until the gear hits the stop and cannot be turned further.

i. Connect the a-c vtvm to the BRIDGE CALIBRATE jack and the ground to the chassis on the 578Q-1.

j. Rotate the variable resistor shaft (using Bristo wrench attached to spline shaft) to obtain a null on the a-c vtvm. The clutch mounted to the variable resistor shaft will have to be slipped to obtain a null.

NOTE

When the null is obtained, care must be taken not to move the variable resistor gear (figure 3-2).

k. Position MOTOR switch to ON. If the motor-generator pinion oscillates, the alignment between the variable resistor gear and the variable air capacitor gear is complete. If the motor-generator pinion drives the gear train causing the clutch assembly to slip, the alignment is not correct. Refer to step j to correct the alignment.

3.3.2 RESONANT CIRCUIT ADJUSTMENT.

a. Mount the frequency discriminator module to the 578Q-1, and set the POSITIONING MODE switch to BRIDGE, the RATE FEEDBACK switch to ON, the POTENTIOMETER GANG selector to A, and the BRIDGE POSITION selector to C.

b. Calculate the position of the CALIBRATE LINEARITY control as given in paragraph 3.3.1.b.

c. Calculate the position of TRACKING LINEARITY control as follows:

(1) When TRACKING is stamped on the gear plate (figure 3-1), subtract the number stamped on the gear plate from 06.690, and set the TRACKING LINEARITY control to the difference.

(2) If the TRACKING number is not stamped on the gear plate, set the TRACKING LINEARITY control to 0.

NOTE

If the difference calculated above is greater than ±0.15, it will be necessary to set the TRACKING number stamped on the gear plate into a Dekavider connected to the EXTERNAL BRIDGE jacks and set the BRIDGE POSITION control to VAR instead of B when called for.

d. Connect the d-c microvoltmeter to the DISCRIMINATOR OUTPUT jacks and the d-c vtvm to the FLAG OUTPUT jacks. Adjust the RF OUTPUT control on the 476F-1A to obtain an indication of minus 2.75 volts on the d-c vtvm.

e. Position the BRIDGE POSITION selector to C-. When the motor stops running, switch the BRIDGE POSITION selector to B, and observe the pointer movement on the d-c microvoltmeter. When the motor stops running, switch the BRIDGE POSITION selector back from B to C-, and observe the pointer movement on the d-c microvoltmeter.

f. If L1 (figure 3-2) is adjusted properly, the pointer will be at rest at a maximum positive indication on the d-c microvoltmeter dial when the BRIDGE POSITION selector is at C-. When the BRIDGE POSITION selector is moved to B, the pointer on the d-c microvoltmeter will move toward 0 and come to rest at some point before 0. The same sequence occurs when the BRIDGE POSITION selector is moved from C- to C.

g. If L1 (figure 3-2) is not aligned properly, the pointer on the d-c microvoltmeter will first move away (false peak) from 0, then proceed toward 0, stopping at some point before 0 when the BRIDGE POSITION selector is moved from C- to B or from C- to C. If L1 is aligned properly, there will be a smooth transition of pointer travel from the peak indication on the d-c microvoltmeter to a different point nearer 0 (true peak) when the BRIDGE POSITION selector is moved from C- to B and from C- to C.

h. Adjust the slug of L1 (figure 3-2) until the condition for proper alignment of L1 is obtained.

i. Position the BRIDGE POSITION from C+ to D and from C+ to C. The pointer on the d-c microvoltmeter should move smoothly from a maximum negative indication on the d-c microvoltmeter to a different point nearer 0 for both cases if L2 is aligned properly.

j. Adjust the slug of L2 (figure 3-2) until the condition for proper alignment is obtained.

k. Set the BRIDGE POSITION selector to C-, and record the reading on the d-c microvoltmeter.

l. Set the BRIDGE POSITION selector to C+, and adjust R1 (figure 3-2) to obtain an indication on the d-c microvoltmeter equal to the magnitude recorded in step k, but of opposite polarity.

m. Set the BRIDGE POSITION selector to C-, and check to see if the magnitude of the microvoltmeter indication is equal to that found in step l. If this is not true, adjust R1 to obtain an equal magnitude.

n. Repeat steps k, l, and m until the d-c microvoltmeter indications for positions C- and C+ of the BRIDGE POSITION selector are equal in magnitude.

o. Set the BRIDGE POSITION selector from C- to B and from C+ to D, and check to see if there is a smooth transition of the pointer as stated in step i.

p. If a false peak occurs, repeat steps f through n. It is only necessary to adjust L1 and L2 and to balance R1 twice.

q. Set the BRIDGE POSITION selector on the 578Q-1 to B and the FREQUENCY selector on the 476F-1A to 155.500. Adjust the RF OUTPUT control on the 476F-1A to obtain minus 2.75 volts d-c on the vtvm.

r. Record the indication on the d-c microvoltmeter, and adjust the slug of L1 (figure 3-2) to obtain an indication on the microvoltmeter equal to one half the original indication. Adjust the slug of L2 to obtain an indication of 0±5 millivolts. L1 and L2 are now adjusted equally.

s. Adjust L1 and L2 until the center of oscillation of the d-c microvoltmeter pointer is at 0. Check that the TRACKING LINEARITY control and the CALIBRATE LINEARITY control are at the values calculated in paragraphs 3.3.1.b and 3.3.2.c.

t. Set the BRIDGE POSITION selector to C. Set the FREQUENCY selector on the 476F-1A to 158.875, and adjust the RF OUTPUT control to obtain an indication of minus 2.75 volts on the d-c vtvm.

u. The d-c microvoltmeter indication should be 0±5 millivolts. If this is not true, the resonant circuits are out of adjustment. Note whether reading is positive or negative.

v. Set the BRIDGE POSITION selector to position B. Set the FREQUENCY selector on the 476F-1A to 155.550 and the RF OUTPUT control to obtain an indication of minus 2.75 volts on the d-c vtvm.

w. If the indication noted in step u was positive, the resonant circuits contain too much capacitance. Adjust L1 and L2 counterclockwise slightly, and note that the change in the microvoltmeter indication is the same for each. Then adjust C2 and C6 equally clockwise to obtain 0 ±5 millivolts on the d-c microvoltmeter.

x. If the indication noted in step u was negative, the resonant circuits contain too much inductance. Adjust L1 and L2 clockwise slightly, and note that the change in the microvoltmeter indication is the same for each. Then adjust C2 and C6 equally counterclockwise to obtain 0 ±5 millivolts on the d-c microvoltmeter.

y. Repeat step t. If the d-c microvoltmeter indication is not 0 ±5 millivolts, repeat steps t through x. Repeat the complete procedure until the d-c microvoltmeter indicates 0 ±5 millivolts for BRIDGE POSITION selector settings of B and C (frequencies of 155.500 and 158.875 mc).

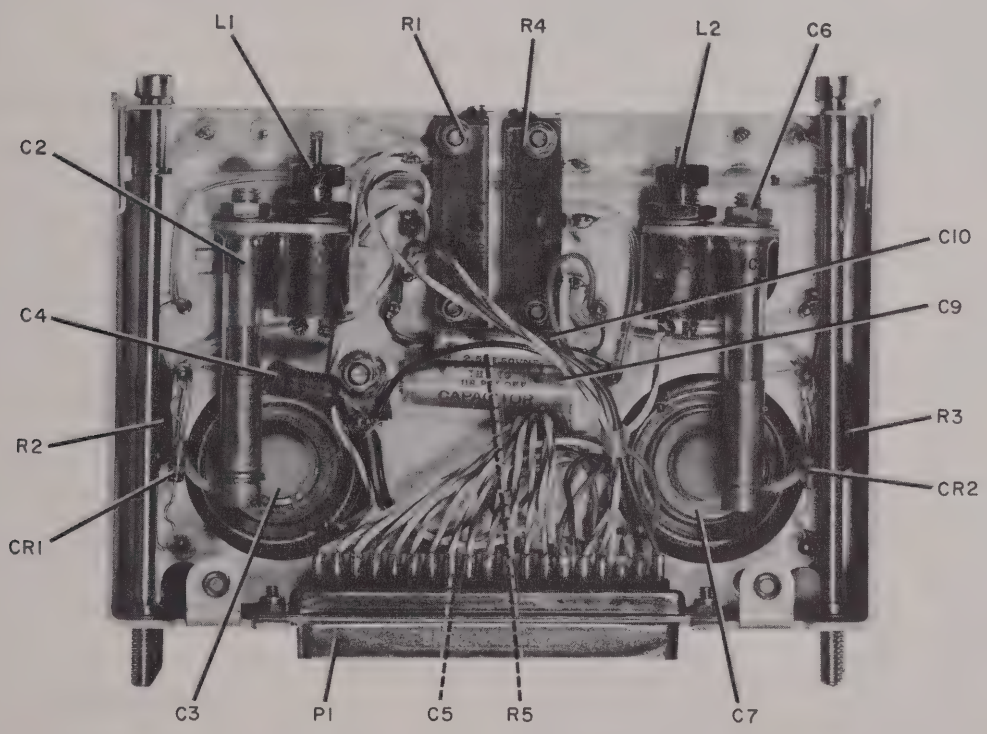


Figure 3-3. Frequency Discriminator Module (Type 1), End View Showing Electrical Components

SECTION IV
PRINCIPLES OF OPERATION

4.1 MODES OF OPERATION.

Frequency Discriminator Test Panel 578Q-1 operates a frequency discriminator module in either the frequency positioning mode or the bridge positioning mode. With the POSITIONING MODE switch set to BRIDGE, a set of resistors in the 578Q-1 are connected across the ground-speed potentiometers in the module to form a bridge. The bridge output is coupled to the servo amplifier and used to drive the discriminator module motor. A doppler signal is coupled to the 578Q-1 from a signal generator, amplified, and fed to the module discriminator when using the frequency-positioning mode. The discriminator output is coupled to a chopper in the 578Q-1, and the chopper output is coupled to the servo amplifier when the POSITIONING MODE switch is set to FREQUENCY. The servo amplifier output drives the discriminator module motor.

4.2 PRINCIPLES OF OPERATION. Refer to figure 4-1.

4.2.1 Power is applied to the 578Q-1 when POWER switch S1 is set to ON, and 400 cps voltage at T1-5 is applied to one winding of the motor (terminal 2) in the module. A-c voltage at T1-6 is applied to chopper G1 in the 578Q-1 with CHOPPER switch S2 set to ON and to one winding (terminal 9) of the rate generator in the module with the RATE FEEDBACK switch S3 set to ON. A-c voltage at terminals 3 and 4 of transformer T1 is applied across the module ground-speed potentiometers and the bridge resistors in the 578Q-1. With the PAWL switch S4 set to IN, 27.5 volts d-c is applied across the pawl solenoid L3 in the module. Voltage to drive motor B1 is obtained from the servo amplifier output and applied to one winding (terminal 3) of the motor when MOTOR switch S6 is set to ON. The MOTOR switch, S6, must be set to ON for the two modes of operation described in paragraphs 4.2.2 and 4.2.3.

4.2.2 BRIDGE-POSITIONING MODE.

One bridge network of three resistors is connected across the ground-speed potentiometers to form a resistance bridge, and the position of the potentiometer in the 578Q-1 bridge resistance network will determine the module motor position. When the POSITIONING MODE switch, S7, is set to BRIDGE, a position output from the resistance bridge is applied to the servo amplifier through the BRIDGE POSITION switch, S8, when set to BRIDGE. Output from the servo amplifier drives the module motor which positions the ground-speed potentiometers and changes the resistance in one leg of the bridge. The module motor will run until the output between the bridge resistor arm in the 578Q-1 and the ground-speed potentiometer is zero. Consequently there will be no voltage from the servo amplifier to drive the motor. Various values of bridge resistances in the 578Q-1 are selected by BRIDGE POSITION switch S8. Other resistance values needed may be set on an external precision bridge connected to the EXTERNAL BRIDGE terminals and used with BRIDGE POSITION switch S8 set to VAR. One of the arms of the four (two in the type 2 module) ground-speed potentiometers is grounded through POTENTIOMETER GANG switch S7 and fuse F2. POSITIONING MODE switch S7 has to be set to BRIDGE to position the module motor when using the 578Q-1 bridge networks.

4.2.3 A doppler signal can be connected to the 578Q-1 INPUT jack, J1, and this frequency will be used to determine the position of the module motor. The doppler signal is amplifier by Q1 and Q2 and coupled to the module discriminator. It also is detected by CR3 and CR4 to provide a d-c output representing the flag voltage produced by the doppler signal. The module discriminator output is coupled to DISCRIMINATOR OUTPUT test jack J4 and chopper G1 in the 578Q-1. The chopper output is coupled to the servo amplifier through the POSITIONING MODE switch, S7, when set to FREQUENCY. The servo amplifier output will drive the module motor which positions tuning capacitors in the discriminator. When the capacitors are positioned correctly, the discriminator output will be reduced to zero. The input to the servo amplifier will now be zero, and the module motor will have no driving voltage and stop. The CHOPPER switch S2 has to be set to ON and the POSITIONING MODE switch, S7, has to be set to FREQUENCY to position the module motor when using a doppler signal input.

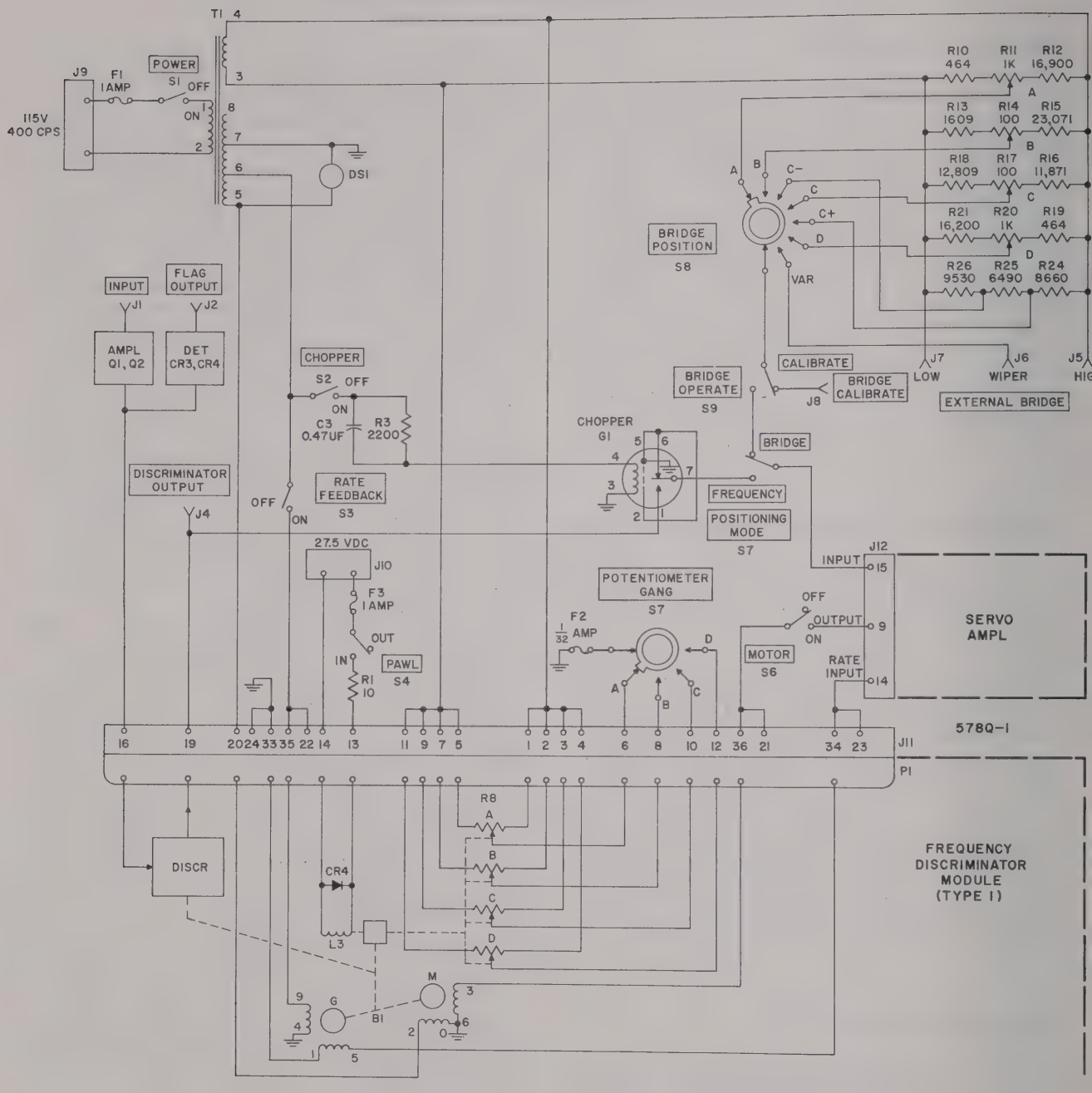


Figure 4-1. Frequency Discriminator Module Test, Simplified Schematic Diagram

SECTION V
MAINTENANCE

1 TESTING.

1.1 TEST EQUIPMENT REQUIRED.

he following test equipments or their equivalents re required for testing and adjusting Frequency iscriminator Test Panel 578Q-1.

Dekavider Model DV411

VTVM, Ballantine Model 300

Voltohmmeter, Triplett Model 630

Signal Generator, Hewlett-Packard Model 200CD

Test jig (figure 5-1)

Resistor 5 ohm 1/2 watt

Power source 27.5 ±5% volts d-c

Power source 115 ±5% volts 400 cps

1.2 PRELIMINARY TESTS.

onnect the 5-ohm 1/2-watt resistor across CR1 the 578Q-1 servo amplifier (see figure 5-5). onnect the test jig, figure 5-1, to J11 of the Frequency iscriminator Test Panel 578Q-1.

1.2.1 CONTINUITY CHECK.

heck for continuity between the following pins of the st jig, figure 5-1.

J1-J2	J20-J37
J2-J3	J21-J36
J3-J4	J23-J34
J5-J7	J24-J33
J7-J9	J33-ground
J9-J11	

5.1.3 OPERATION CHECK.

Connect the test jig, figure 5-1, to J11 of the 578Q-1. Connect 27.5 v d-c and 115 v 400 cps to the proper connectors, J9 and J10 (see figure 2-1). Set the controls of the 578Q-1 to the following positions.

MOTOR	OFF
CHOPPER	OFF
POWER	OFF
RATE FEEDBACK	OFF
PAWL	OUT
POSITIONING MODE	FREQUENCY
BRIDGE	CALIBRATE

a. Move the POWER switch to ON. The power monitor light on the 578Q-1 should illuminate.

b. Remove the 1/32-ampere fuse from the front panel of the 578Q-1, and replace it with a 1/2-ampere fuse.

c. Move the PAWL switch to IN. The PAWL light on the test jig should illuminate.

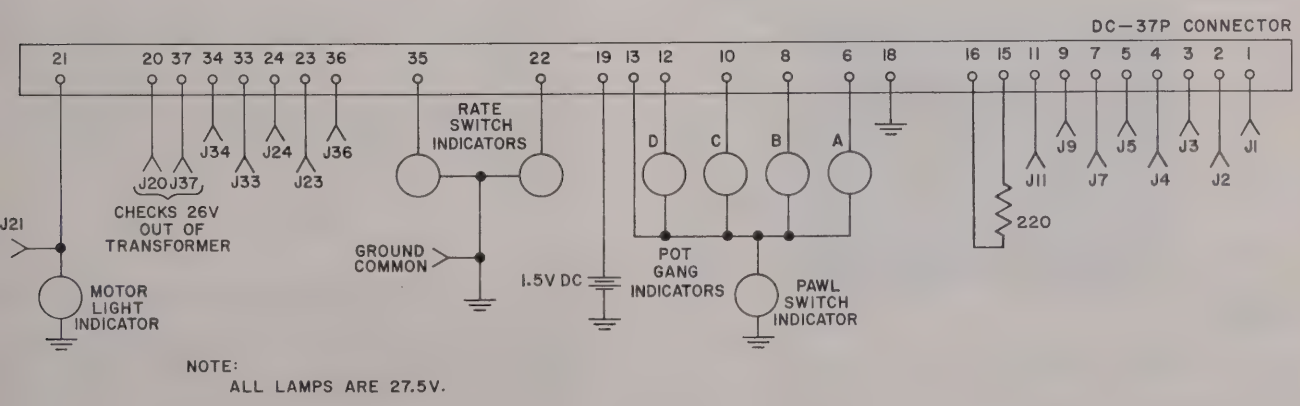


Figure 5-1. 578Q-1 Test Jig, Schematic Diagram

d. Move the RATE FEEDBACK switch to ON. Both RATE lights on the test jig should illuminate. Return the RATE FEEDBACK switch to OFF.

e. Move the PAWL switch to IN position and hold. Move the POTENTIOMETER GAIN selector to position A, position B, position C, and position D; the respective lights on the test jig should illuminate. Release the PAWL switch. Remove the 1/2-ampere fuse substituted in step b, and replace the 1/32-ampere fuse.

f. Move the CHOPPER switch to ON. The chopper hum should be heard.

g. Move the MOTOR switch to ON. The MOTOR lamp on the test jig should illuminate.

h. Move the CHOPPER switch to OFF. The MOTOR lamp on the test jig should go off.

NOTE

If the MOTOR lamp does not go off in step h, reduce the value of the 5-ohm resistor of paragraph 5.1.2 to such a value that the lamp does go off when the procedure of step h is accomplished.

Return the CHOPPER switch to ON position.

i. Set the POSITIONING MODE selector to BRIDGE. The MOTOR lamp of the test jig should go off.

j. Connect a jumper between the EXTERNAL BRIDGE LOW jack and ground.

k. Move the BRIDGE switch to OPERATE position. The MOTOR lamp on the test jig should go on when the BRIDGE POSITION selector is in any position except VAR.

l. Remove the jumper of step j above. Remove the 5-ohm resistor of paragraph 5.1.2.

CAUTION

Never ground any of the EXTERNAL BRIDGE jacks except in the sequence outlined above.

5.1.4 VOLTAGE MEASUREMENTS.

Measure voltage between points indicated in table 5-1; the proper voltages are indicated in table 5-1.

TABLE 5-1
VOLTAGE CHART

POINTS	VOLTS
J1 to J11 of test jig	26 ±2 a-c
HI to LOW of EXTERNAL BRIDGE jack	26 ±2 a-c
J20 to test jig to ground	26 ±2 a-c
Pin 3 to ground of servo amplifier socket (servo amplifier removed)	26 ±2.5 d-c

TABLE 5-1
VOLTAGE CHART (Cont)

POINTS	VOLTS
Pin 13 to ground of servo amplifier socket (servo amplifier removed)	20 ±1 d-c
DISCRIMINATOR OUTPUT jack to ground	1.5 ±0.2 d-c

Apply 1.0 volt a-c 155.0 kc to the coaxial INPUT of the 578Q-1, and measure the d-c voltage at the FLAG OUTPUT of the 578Q-1. This voltage should be 2.0 ±0.2 volts d-c.

5.1.5 SERVO AMPLIFIER TROUBLE SHOOTING.

To trouble-shoot the servo amplifier, first remove it from the 578P-1 chassis by loosening the module retaining screws and lifting the module from the chassis.

5.1.6 TEST SETUP.

A d-c power supply is used to supply 27.5 volts d-c directly to the servo amplifier module test jig (figure 5-2). A signal input of one millivolt from the audio oscillator is applied through the module test jig to J1-15.

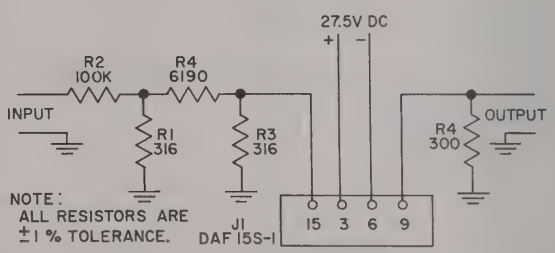


Figure 5-2. Servo Amplifier Module Test Jig, Schematic Diagram

NOTE

If the audio oscillator is incapable of producing a one-millivolt output, mount a 10K limiting resistor to the positive side of the audio oscillator output, and a 100-ohm limiting resistor to the ground side. Secure these two resistors to the signal input lead wire which connects with pin 15 of connector J1 on the servo amplifier module test jig.

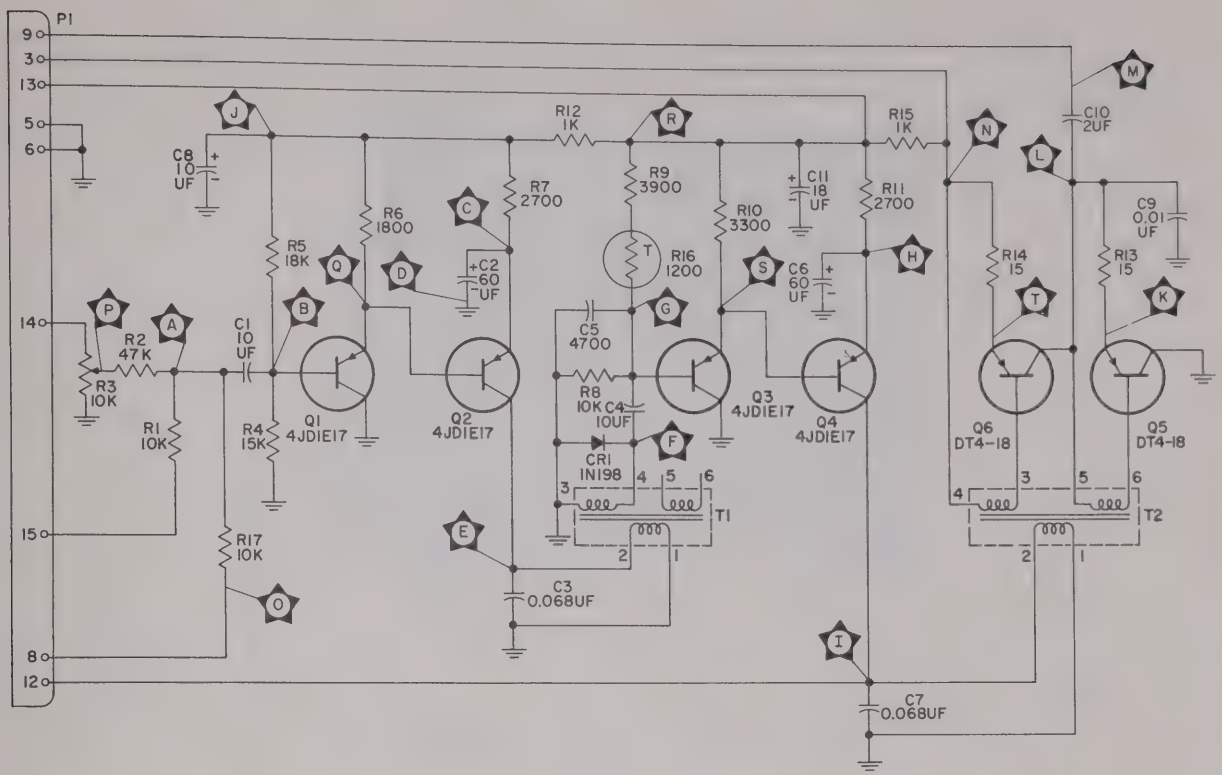


Figure 5-3. Servo Amplifier Module, Schematic Diagram

Connect a 300-ohm load to the output of the servo amplifier (pin 9). Pins 5 and 6 of connector J1 are grounded. The voltage at the output should be approximately 6 volts a-c. The voltohmmeter (Triplett 630) is used to obtain d-c voltage readings from the servo amplifier test points shown in figure 5-3. Measure the voltages at the test points indicated in table 5-2. See figure 5-4 for the location of the test points on the module. The correct response is given in table 5-2.

NOTE

It must be remembered that the parameters of transistors will vary somewhat. The readings given in table 5-2 were obtained from representative servo amplifiers. Other servo amplifiers may have transistors with somewhat different parameters, and the voltage at the test points can be expected to vary accordingly.

5.2 POTENTIOMETER ADJUSTMENTS.

a. Set the BRIDGE switch to CALIBRATE position.
b. Connect the Dekavider between the EXTERNAL BRIDGE HIGH and LOW jacks of the 578Q-1.
c. Connect an a-c voltmeter between the EXTERNAL BRIDGE WIPER and BRIDGE CALIBRATE jacks.
d. Set the Dekavider to 0387.
e. Set the BRIDGE POSITION selector to position A, and adjust R11 for a null as indicated on the a-c voltmeter of step c.
f. Set the Dekavider to 0669.5.
g. Set the BRIDGE POSITION selector to position B.
h. Adjust the TRACKING LINEARITY control to obtain a null on the a-c voltmeter of step c above.

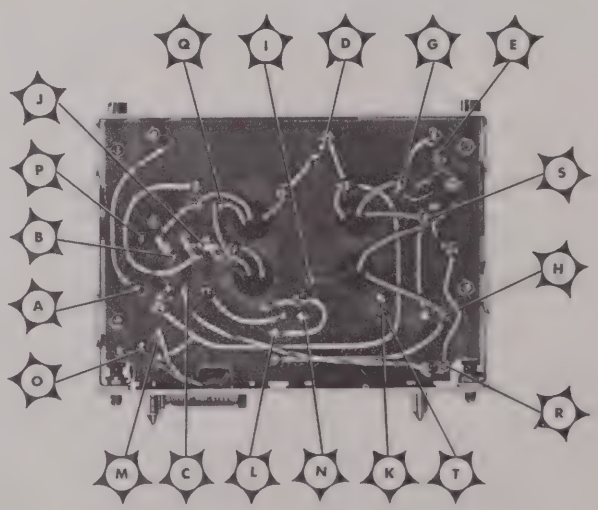


Figure 5-4. Servo Amplifier Test Points

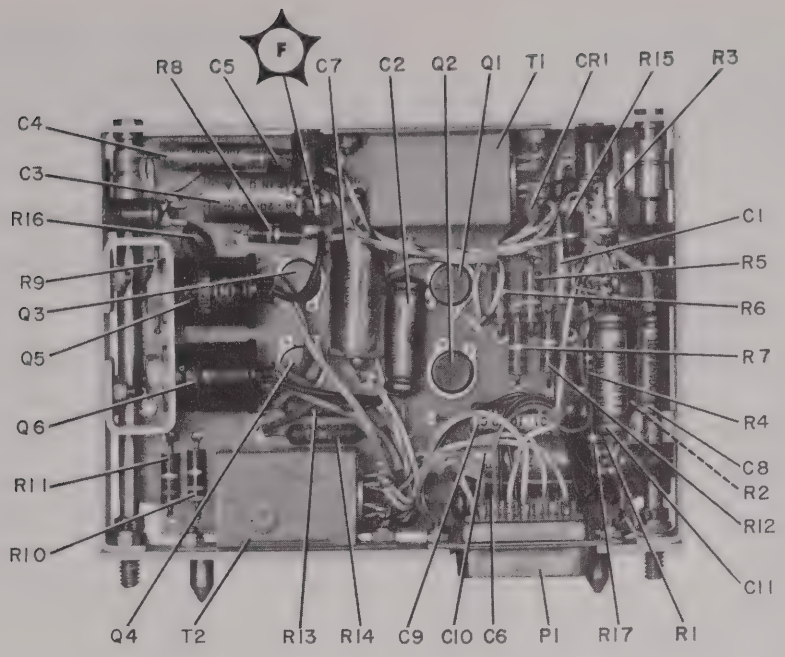


Figure 5-5. Servo Amplifier, Side View

i. Loosen the setscrews in the TRACKING LINEARITY control knob; set the knob pointer to zero and tighten the setscrews. Ensure that the -.15 and +.15 marks fall within the range of the control. Ensure that the wiper arm of the potentiometer makes contact as the control knob is rotated between the -.15 mark and the +.15 mark.

j. Set the BRIDGE POSITION selector to position C-.

k. Adjust the Dekavider to obtain a null as indicted on the a-c voltmeter of step c. At the null point, the Dekavider should indicate 3850.0 ±67 ohms.

l. Set the BRIDGE POSITION selector to position C.

m. Set the Dekavider to 5189.3.

n. Adjust the CALIBRATE LINEARITY control to obtain a null indication on the a-c voltmeter of step c.

o. Loosen the setscrews of the CALIBRATE LINEARITY control knob, set the pointer of the knob to zero, and tighten the setscrews. Ensure that the wiper arm of the potentiometer makes contact as the control knob is rotated between the -.15 and +.15 marks.

p. Set the BRIDGE POSITION selector to position C+.

q. Adjust the Dekavider to obtain a null indication on the a-c voltmeter of step c. At the null point, the Dekavider should indicate 6528.0 ±67 ohms.

r. Set the BRIDGE POSITION control to position D.

s. Set the Dekavider to 9709.0 ohms.

t. Adjust R20 for a null indication on the a-c voltmeter of step c.

u. Remove the voltmeter of step c.

TABLE 5-2. SERVO AMPLIFIER VOLTAGE MEASUREMENTS

TEST POINTS	REFERENCE SYMBOL	VALUE	APPROXIMATE D-C POTENTIAL
A to B	C1	10 uf	6
C to D	C2	60 uf	5.75
E to D	C3	0.068 uf	0.47
F to G	C4	10 uf	12
G to D	C5	0.0047 uf	12

TABLE 5-2. SERVO AMPLIFIER VOLTAGE MEASUREMENTS (Cont)

TEST POINTS	REFERENCE SYMBOL	VALUE	APPROXIMATE D-C POTENTIAL
H to D	C6	60 uf	13.5
I to D	C7	0.008 uf	0.42
J to D	C8	10 uf	11
L to D	C9	0.01 uf	10.1
L to M	C10	2 uf	10.1
N to D	C11	18 uf	18
A to O	R1	10K	0
A to P	R2	47K	0
P to D	R3	10K	0
B to D	R4	15K	5.2
J to B	R5	18K	6
J to Q	R6	1800	6.1
J to C	R7	2700	5.9
G to R	R9	3900	5
S to R	R10	3300	5
H to R	R11	2700	5
J to R	R12	1000	6
K to L	R13	15	0.4
N to T	R14	15	0.4
R to N	R15	1000	10

SECTION VI
PARTS LIST

578Q-1 Frequency Discriminator Test Panel

ITEM	DESCRIPTION	COLLINS PART NUMBER
	578Q-1 FREQUENCY DISCRIMINATOR TEST PANEL	522-2066-00
C1	CAPACITOR, FIXED, ELECTROLYTIC: (tantalum) 1 uf -45% +25%, 150 vdcw	184-7236-00
C2	CAPACITOR, FIXED, PAPER: 0.0047 uf ±20%, 300 vdcw; 0.235 in. dia by 3/4 in. lg	931-4522-00
C3	CAPACITOR, FIXED, PAPER: 0.47 uf ±20%, 100 vdcw; 0.562 in. dia by 1-3/8 in. lg	931-4496-00
C4	CAPACITOR, FIXED, ELECTROLYTIC: (tantalum) 2.5 uf -45% +50%, 50 vdcw	182-7246-00
C5	CAPACITOR, FIXED, ELECTROLYTIC: same as C4	182-7246-00
C6	CAPACITOR, FIXED, ELECTROLYTIC: 100 uf -10% +100%, 15 vdcw	183-1564-00
C7	CAPACITOR, FIXED, ELECTROLYTIC: same as C6	183-1564-00
C8	CAPACITOR, FIXED, PAPER: same as C2	931-4522-00
C9	CAPACITOR, FIXED, PAPER: same as C2	931-4522-00
C10	CAPACITOR, FIXED, PAPER: 0.01 uf ±20%, 100 vdcw, 0.235 in. dia by 3/4 in. lg	931-4481-00
CR1	SEMICONDUCTOR DEVICE, DIODE: silicon; axial lead mtd; metal and glass case, hermetically sealed; 400 volts peak inverse voltage, 400 volts max d-c reverse voltage	353-1659-00
CR2	SEMICONDUCTOR DEVICE, DIODE: silicon; power Zener; hermetically sealed; Zener voltage 20 volts ±5%; 150 ma d-c	353-2629-00
CR3	SEMICONDUCTOR DEVICE, DIODE: germanium; hermetically sealed; 80 volts d-c reverse working voltage; -100 volts d-c max peak inverse voltage	353-2018-00
CR4	SEMICONDUCTOR DEVICE, DIODE: same as CR3	353-2018-00
DS1	LAMP, INCANDESCENT: miniature; single contact w/ T-3-1/4, clear bulb; 28 volts, 0.17 amp	262-3270-00
F1	FUSE, CARTRIDGE: glass enclosed, 1.00 amp, 250 volts max; 0.23 ohm resistance; 0.250 in. dia by 1-1/4 in. lg	264-4050-00
F2	FUSE, CARTRIDGE: glass enclosed; 1/32 amp, 250 volts max; 0.230 in. dia by 1-1/4 in. lg	264-0378-00
F3	FUSE, CARTRIDGE: same as F1	264-4050-00
G1	CHOPPER, ELECTRONIC: 400 cps ±20 cps square or sine wave; 6.3 volts rms ±7% coil voltage; 300 ohms ±25% coil impedance	354-1022-00
J1	CONNECTOR, RECEPTACLE, ELECTRICAL: for use w/ RG-55/U, RG-58/U coaxial cables; teflon insulation, copper contact, brass shell; 11/16 in. across hex, 1-5/32 in. lg	357-9248-00
J2	POST, BINDING: w/ banana plug jack, red nylon insulation; 1000 vdcw; 30 amp current; 3/4 in. lg	372-1062-00
J3	POST, BINDING: w/ banana plug jack, black nylon insulation; 1000 vdcw; 30 amp current; 3/4 in. lg	372-1061-00
J4	POST, BINDING: same as J2	372-1062-00
J5	POST, BINDING: same as J2	372-1062-00
J6	POST, BINDING: same as J2	372-1062-00
J7	POST, BINDING: same as J2	372-1062-00
J8	POST, BINDING: same as J2	372-1062-00
J9	CONNECTOR, PLUG, ELECTRICAL: twist lock; 3-wire midget; black bakelite body; nickel casing; 10 amp, 250 volts, 15 amp, 125 volts	368-0016-00
J10	CONNECTOR, PLUG, ELECTRICAL: twist lock; 2-wire midget; 10 amp, 250 volts; 15 amp, 125 volts	368-0134-00
J11	CONNECTOR, RECEPTACLE, ELECTRICAL: 37 female contacts, 1 connector mating end; nylon insulation; copper alloy contacts	371-0043-00
J12	CONNECTOR, RECEPTACLE, ELECTRICAL: 15 female contacts, 1 connector mating end; nylon insulation, copper alloy contacts	371-0041-00
P1 thru P8	NOT USED	

ITEM	DESCRIPTION	COLLINS PART NUMBER
P9	CONNECTOR, PLUG, ELECTRICAL: twist lock, 3-wire midget; black bakelite; 10 amp at 250 volts, 15 amp 125 volts	368-0015-00
P10	CONNECTOR, PLUG, ELECTRICAL: twist lock; 3-wire midget; black bakelite; 10 amp, 259 volts, 15 amp, 125 volts	368-0010-00
Q1	TRANSISTOR: PNP germanium transistor, hermetically sealed	352-0215-00
Q2	TRANSISTOR: same as Q1	352-0215-00
R1	RESISTOR, FIXED, COMPOSITION: 1100 ohms ±5%, 3 w	745-9433-00
R2	RESISTOR, FIXED, COMPOSITION: 1000 ohms ±10%, 1/2 w	745-1352-00
R3	RESISTOR, FIXED, COMPOSITION: 2200 ohms ±10%, 1/2 w	745-1366-00
R4	RESISTOR, FIXED, COMPOSITION: 4700 ohms ±10%, 1/2 w	745-1380-00
R5	RESISTOR, FIXED, COMPOSITION: same as R4	745-1380-00
R6	RESISTOR, FIXED, COMPOSITION: 3300 ohms ±10%, 1/2 w	745-1373-00
R7	RESISTOR, FIXED, COMPOSITION: same as R3	745-1366-00
R8	RESISTOR, FIXED, COMPOSITION: 100 ohms ±10%, 1/2 w	745-1310-00
R9	RESISTOR, FIXED, COMPOSITION: 1500 ohms ±10%, 1/2 w	745-1359-00
R10	RESISTOR, FIXED, FILM: 464 ohms ±1%, 1/4 w	705-7080-00
R11	RESISTOR, VARIABLE: wirewound; 1000 ohms ±10%, 2 w	750-0524-00
R12	RESISTOR, FIXED, FILM: 16,900 ohms ±1%, 1/4 w	705-7155-00
R13	RESISTOR, FIXED, WIREWOUND: 1,609 ohms ± 0.01%, 1 w	748-1150-00
R14	RESISTOR, VARIABLE: wirewound, 100 ohms ±5%, 2 w	381-1435-00
R15	RESISTOR, FIXED, WIREWOUND: 23,071 ohms ± 0.01%, 1 w	748-1153-00
R16	RESISTOR, FIXED, WIREWOUND: 11,871 ohms ± 0.01%, 1 w	748-1151-00
R17	RESISTOR, VARIABLE: same as R14	381-1435-00
R18	RESISTOR, FIXED, WIREWOUND: 12,809 ohms ± 0.01%, 1 w	748-1152-00
R19	RESISTOR, FIXED, FILM: same as R10	705-7080-00
R20	RESISTOR, VARIABLE: same as R11	750-0524-00
R21	RESISTOR, FIXED, FILM: 16,200 ohms ±1%, 1/4 w	705-7154-00
R22	RESISTOR, FIXED, COMPOSITION: 82 ohms ±10%, 1 w	745-3307-00
R23	RESISTOR, FIXED, COMPOSITION: 100 ohms ±10%, 1 w	745-3310-00
R24	RESISTOR, FIXED, FILM: 8,660 ohms ±1%, 1/4 w	705-7141-00
R25	RESISTOR, FIXED, FILM: 6,490 ohms ±1%, 1/4 w	705-7135-00
R26	RESISTOR, FIXED, FILM: 9,530 ohms ±1%, 1/4 w	705-7143-00
R27	NOT USED	
R28	RESISTOR, FIXED, COMPOSITION: same as R3	745-1366-00
R29	RESISTOR, FIXED, COMPOSITION: same as R2	745-1352-00
R30	RESISTOR, FIXED, COMPOSITION: 10K ±10%	745-1394-00
S1	SWITCH, TOGGLE: spst; 250 volts d-c, 0.5 amp, 30 volts d-c, 20 amp; 220 volts a-c, 6 amp, 115 volts a-c, 15 amp	266-5011-00
S2	SWITCH, TOGGLE: same as S1	266-5011-00
S3	SWITCH, TOGGLE: same as S1	266-5011-00
S4	SWITCH, TOGGLE: spst; 250 volts d-c, 0.5 amp; 30 volts d-c 20 amp; 220 volts a-c, 6 amp; 115 volts a-c, 15 amp	266-5013-00
S5	SWITCH SECTION, ROTARY: 1 circuit, 12 position, 1 section, 5 fixed, 2 moving circuit contacts	259-1285-00
S6	SWITCH, TOGGLE: same as S1	266-5011-00

578Q-1 Frequency Discriminator Test Panel

ITEM	DESCRIPTION	COLLINS PART NUMBER
S7	SWITCH, TOGGLE: spdt; 250 volts d-c, 0.5 amp; 30 volts d-c, 20 amp; 220 volts a-c, 6 amp; 115 volts a-c, 15 amp	266-5014-00
S8	SWITCH SECTION, ROTARY: 1 circuit, 12 position, 1 section; 8 fixed, 2 moving contacts	259-1286-00
S9	SWITCH, TOGGLE: same as S7	266-5014-00
T1	TRANSFORMER, POWER, STEP-DOWN: pri 115 volts; sec no. 1, 26 volts, 100 ma; sec no. 2, 52 volts, 275 ma, CT; sec no. 3, 18 volts, 200 ma; 360-440-cps; continuous duty cycle	662-0508-00
TB1	TERMINAL BOARD, NO. 1: plastic, 3/32 in. thk; 4 in. by 4-1/16 in.; 43 terminals	547-1812-003
TB2	TERMINAL BOARD, NO. 2: plastic, 1/16 in. thk; 1-13/32 in. by 4-29/32 in.; 6 terminals	547-1807-002
XDS1	LAMPHOLDER ASSEMBLY: for use w/ bayonet base type T-3-1/4 lamp; brass lens-holder and bushing	262-0919-00
XF1	FUSEHOLDER: extractor post type for use w/ 1-1/4 x 1/4 fuses of 15 amp, 250 volts rating	265-1019-00
XF2	FUSEHOLDER: same as XF1	265-1019-00
XF3	FUSEHOLDER: 1 pole block type w/ solder-lug terminals, for use w/ 1-1/4 x 1/4 fuses of max rating of 20 amp	265-1067-00
	SERVO AMPLIFIER	542-4781-005
A1	WRAP-AROUND BEARING: aluminum; chromate dip; 4-5/16 in. lg by 3-1/16 in. h 0.050 in. thk	542-6263-004
A2	BRACKET, TRANSISTOR: aluminum; chromate dip; 1-11/32 in. lg by 0.592 in. w by 0.050 in. thk	542-6264-002
A3	PLATE, BASE, BEARING: aluminum; chromate dip; 4-13/32 in. lg by 59/64 in. w by 0.064 in. thk	542-6258-003
C1	CAPACITOR, FIXED, ELECTROLYTIC: 10 uf +75% -15%, 15 volts d-c	184-7226-00
C2	CAPACITOR, FIXED, ELECTROLYTIC: 100 uf, -15% +50%, 50 volts d-c	184-7038-00
C3	CAPACITOR, FIXED, PAPER: 0.068 uf, ±20%, 200 volts d-c	931-4506-00
C4	CAPACITOR, FIXED, ELECTROLYTIC: same as C1	184-7226-00
C5	CAPACITOR, FIXED, PAPER: 0.0047 uf, ±20%, 100 volts d-c	931-9082-00
C6	CAPACITOR, FIXED, ELECTROLYTIC: same as C2	184-7038-00
C7	CAPACITOR, FIXED, PAPER: same as C3	931-4506-00
C8	CAPACITOR, FIXED, ELECTROLYTIC: 10 uf +75% -15%, 25 volts d-c	184-7030-00
C9	CAPACITOR, FIXED, PAPER: 0.01 uf ±20%, 100 volts d-c	931-9078-00
C10	CAPACITOR, FIXED, ELECTROLYTIC: 2 uf, -15% +30%, 150 volts d-c	184-7223-00
C11	CAPACITOR, FIXED, ELECTROLYTIC: 18 uf, +75% -15%, 50 volts d-c	184-7036-00
CR1	SEMICONDUCTOR DEVICE, DIODE: germanium; Transitron Electric type 1N198	353-0160-00
E1	TERMINAL, STUD: brass conductor; 1/4 in. hex; 0.632 in. lg	306-0234-00
E2 thru E4	TERMINAL, STUD: same as E1	306-0234-00
E5	TERMINAL, LUG: bronze; rd tongue end; 0.020 in. thk by 3/16 in. od by 13/32 in. lg	304-0332-00
E6	TERMINAL, LUG: same as E1	304-0234-00
E7	TERMINAL, LUG: same as E1	304-0234-00
H1	WASHER, NONMETALLIC: mica; 0.500 in. od, 0.203 in. id, 0.004 in. thk	302-0410-00
H2	WASHER, FLAT: electrolytic tough pitch copper; 0.500 in. od, 0.172 in. id, 0.036 in. thk	310-0452-00
H3	NUT, PLAIN, HEXAGON: copper; 8-32 NC-2B thd, 0.343 in. w across flats, 0.130 in. h o/a	313-0188-00
H4	NUT, SELF-LOCKING, HEXAGON: aluminum alloy; 2-56 NC-3B thd, 0.158 in. w across flats, 0.095 in. h o/a	333-0604-00
H5	NUT, SELF-LOCKING, HEXAGON: aluminum alloy; 4-40 NC-3B thd; 0.190 in. w across flats, 0.110 in. h o/a	333-0605-00
H6	RING, RETAINING: beryllium copper; 0.114 in. id, 0.282 in. od, 0.025 in. thk	340-0252-00
H7	RING, RETAINING: copper, split ring type; 0.309 in. id, 0.025 in. thk	340-0042-00
H8	WASHER, FLAT: CRES; 0.171 in. id, 0.250 in. od, 0.018 in. thk	542-1590-003
H9	SCREW EXTERNALLY RELIEVED BODY: CRES; 0.234 in. dia, 3.496 in. lg, 8-32NC-2A, 11/32 in. slotted head	542-6158-002
H10	FERRULE, ELECTRICAL CONDUIT: plastic, varnish finish; 0.250 in. od by 0.171 in. id by 0.040 in. thk	542-6161-002
O1	PIN, LOCATING: stainless steel, passivated; 0.184 in. dia by 11/32 in. lg undercut to 0.124 in. dia., 0.096 in. lg; 0.4397 in. lg, o/a; one end drilled 0.093 in. dia by 3/32 in. deep	540-7766-002
O2	PIN, LOCATING: CRES; one end tapered end, opposite end undercut to 0.124 in. dia, 0.096 in. lg tapped 0.093 in. dia by 3/32 in. deep, 0.184 in. od by 0.40775 in. lg o/a	540-7763-002
P1	CONNECTOR, RECEPTACLE, ELECTRICAL: 15 male contacts; straight shape	371-0020-00
Q1	TRANSISTOR: germanium; General Electric type 4JD1A-17	352-0009-00
Q2 thru Q4	TRANSISTOR: same as Q1	352-0009-00
Q5	TRANSISTOR: germanium; C.B.S. - Hytron DT4-18	352-0044-00
Q6	TRANSISTOR: same as Q5	352-0044-00
R1	RESISTOR, FIXED, COMPOSITION: 10,000 ohms ±10%, 1/2 w	745-1394-00
R2	RESISTOR, FIXED, COMPOSITION: 47,000 ohms ±10%, 1/2 w	745-1422-00
R3	RESISTOR, VARIABLE WIREWOUND: 10,000 ohms ±10%, 0.8 w	381-1114-00
R4	RESISTOR, FIXED, COMPOSITION: 15,000 ohms ±10%, 1/2 w	745-1401-00
R5	RESISTOR, FIXED, COMPOSITION: 18,000 ohms ±10%, 1/2 w	745-1405-00
R6	RESISTOR, FIXED, COMPOSITION: 1800 ohms ±10%, 1/2 w	745-1363-00
R7	RESISTOR, FIXED, COMPOSITION: 2700 ohms, ±10%, 1/2 w	745-1370-00
R8	RESISTOR, FIXED, COMPOSITION: same as R1	745-1394-00
R9	RESISTOR, FIXED, COMPOSITION: 3300 ohms ±10%, 1/2 w	745-1373-00
R10	RESISTOR, FIXED, COMPOSITION: same as R9	745-1373-00
R11	RESISTOR, FIXED, COMPOSITION: same as R7	745-1370-00
R12	RESISTOR, FIXED, COMPOSITION: 1000 ohms ±10%, 1/2 w	745-1352-00
R13	RESISTOR, FIXED, WIREWOUND: 15 ohms ±1%, 2 w	746-9305-00
R14	RESISTOR, FIXED, WIREWOUND: same as R13	746-9305-00
R15	RESISTOR, FIXED, COMPOSITION: same as R12	745-1352-00
R16	RESISTOR, THERMAL: 1200 ohms at 25°C w/ resistance contant of 3800 ohm ±10%	714-1564-00
R17	RESISTOR, FIXED, COMPOSITION: same as R1	745-1394-00
T1	TRANSFORMER, AUDIO FREQUENCY: plate coupling type; 2000 ohms pri, 4 ma; 360 to 440 cps; 200, 200 ohms sec, 0 ma	677-1069-00
T2	TRANSFORMER, AUDIO FREQUENCY: same as T1	677-1069-00
TB1	TERMINAL BOARD: plastic, copper clad glass epoxy; 1/16 in. thk, 4-1/4 in. lg by 3-1/32 in. h	546-4211-00

Figure 6-1. Front Panel, Parts Placement

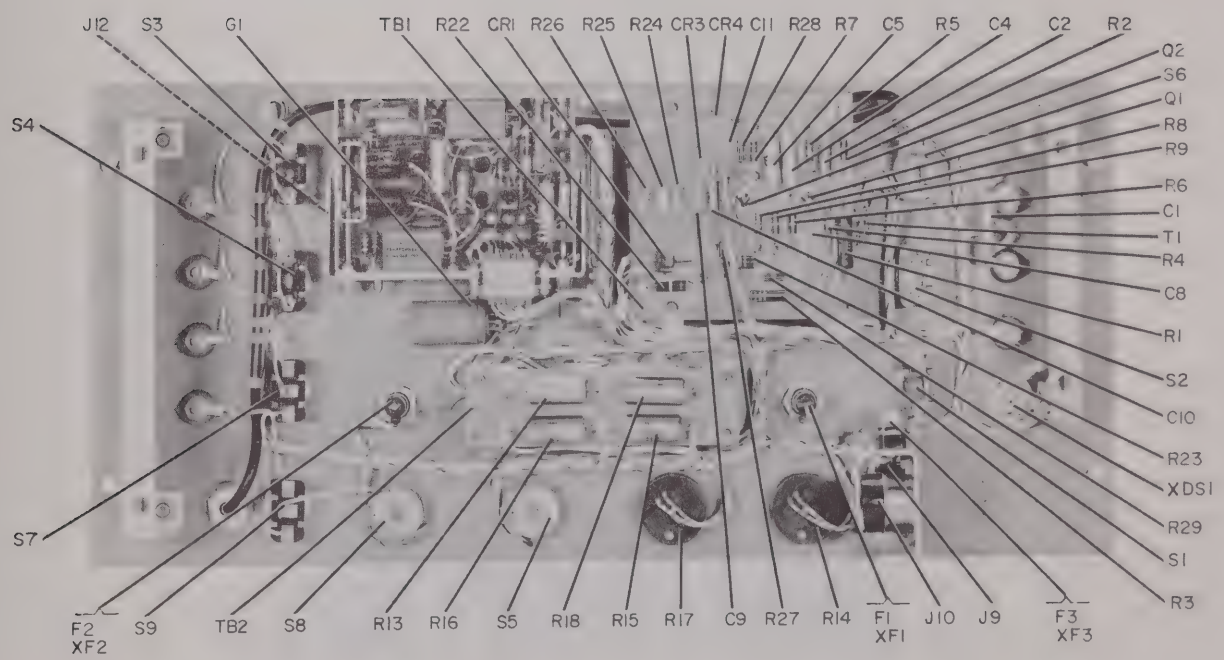


Figure 6-2. Rear View, Parts Placement

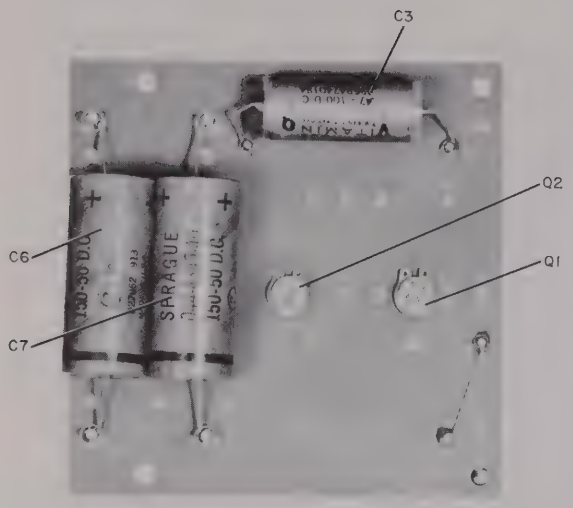


Figure 6-3. Terminal Board Number 1, Parts Placement

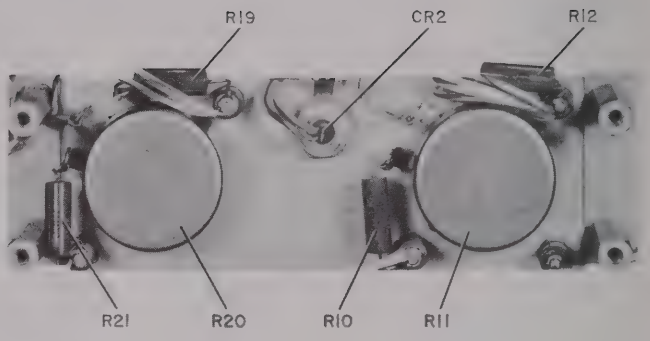


Figure 6-4. Under Terminal Board Number 2, Parts Placement

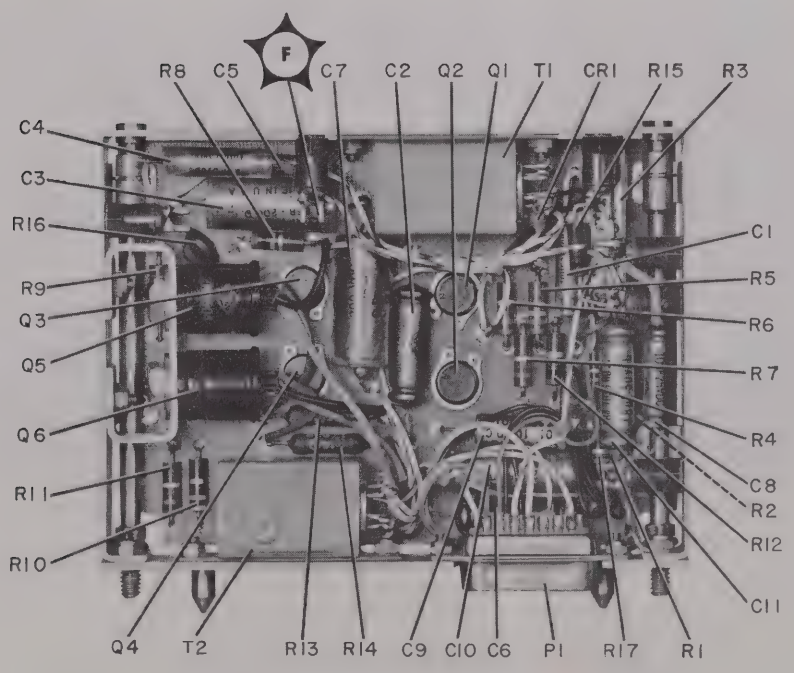


Figure 6-5. Servo Amplifier Module, Parts Placement

SECTION VII
ILLUSTRATIONS

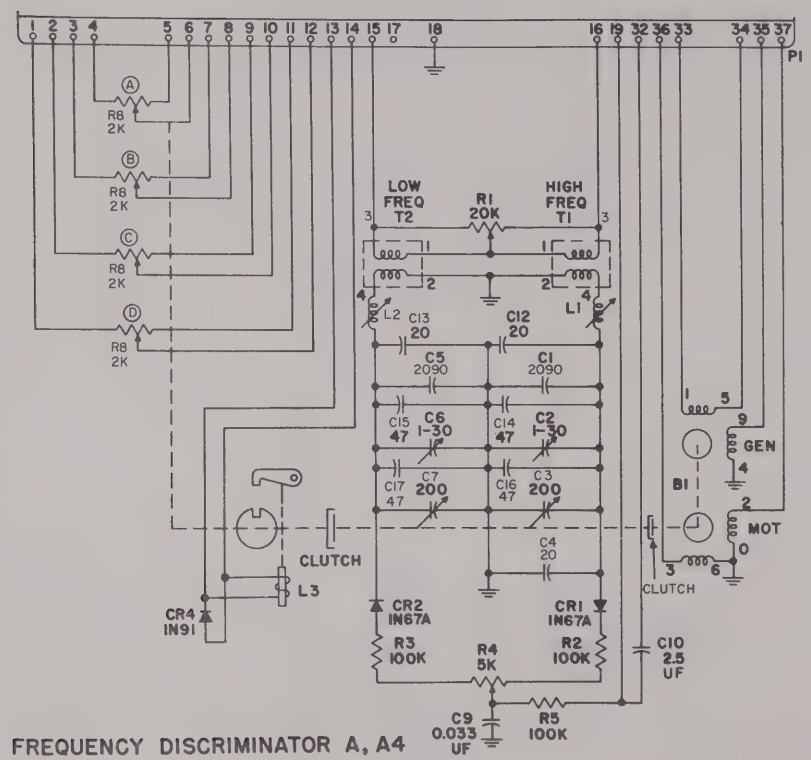


Figure 7-1. Frequency Discriminator (Type 1) Module, Schematic Diagram

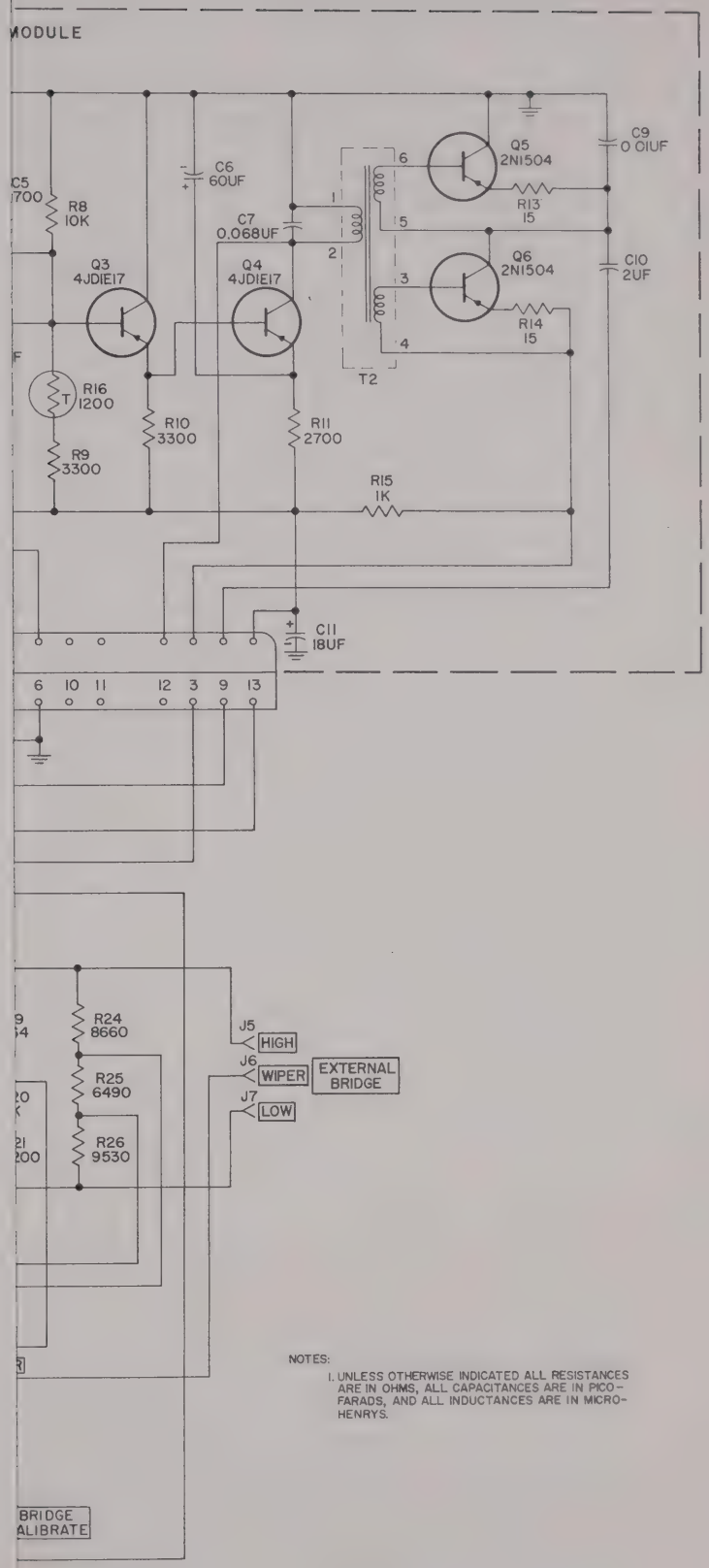


Figure 7-2. Frequency Discriminator Test Panel 578Q-1, Schematic Diagram

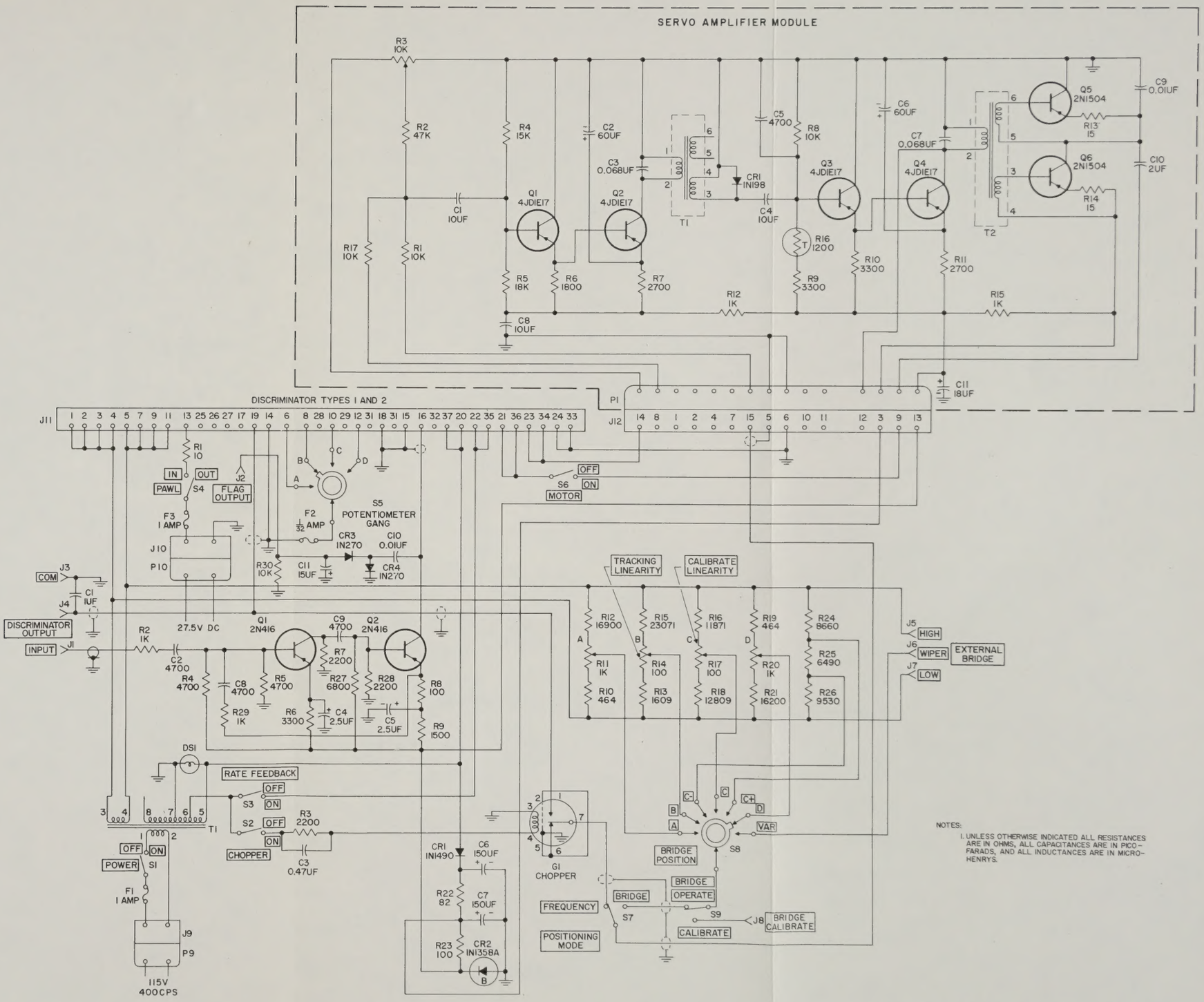


Figure 7-2. Frequency Discriminator Test Panel 578Q-1, Schematic Diagram

ELECTRICAL WIRE CODE

EXAMPLES

UNSHIELDED WIRE, MIL TYPE B #22 AWG, WHITE WITH RED AND GREEN TRACERS:

D	A	9	25	—	4-1/4
Type of Wire	Size of Wire	Color of Body	Color of Tracers		Length of Wire in Inches (Includes Stripping & Tinning)

SHIELDED WIRE (SINGLE), MIL TYPE C, #15 AWG, WHITE WITH RED AND GREEN TRACERS:

R	D	S	9	25	—	4-1/4
Type of Wire	Size of Wire	Shielded	Color of Body	Color of Tracers		Length of Wire in Inches (Includes Stripping & Tinning)

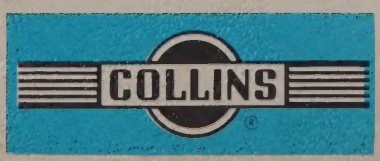
SHIELDED WIRE (MULTIPLE), MIL TYPE B, #22 AWG, WHITE, AND WHITE WITH RED TRACER:

D	A	S	(9)	(92)	—	4-1/4
Type of Wire	Size of Wire	Shielded	First Conductor	Second Conductor		Length of Wire in Inches (Includes Stripping & Tinning)

TYPE OF WIRE CODE		
LETTER	TYPE OF WIRE	FAMILY USUALLY FOUND IN
A	Cotton Braid Over Plastic (Formerly AN-J-C-48)	440 Plain 443 Shielded
B	Busbar, Round Tinned	421
C	MIL-W-16878 Type B (#20 and Larger) (600 Volts)	439
D	Miniature Wire, MIL-W-16878 Type B (#22 & Smaller)	439-7000 Series
E		
F	Extra Flexible Varnished Cambric	423
G		
H	Kel-F (Monochloro-trifluoroethylene)	422
J		
K	Neon Sign Cable (15,000 Volts)	423 0004 00
L	Silicone	425 0942 00
M		
N	Single Conductor Stranded (Not Rubber Covered)	422
P	Single Conductor Stranded (Rubber Covered)	423
Q		
R	MIL-W-16878 Type C (1000 Volts)	439 1000 Series
T	Teflon, MIL-W-16878 Type E (600 Volts)	439 4000 Series
V	MIL-W-16878 Type D (3000 Volts)	439 3000 Series
W	Teflon, MIL-W-16878 Type EE (1000 Volts)	439 0000 Series
X		
Y		
Z	Acetate Yarn Telephone Type	428

SIZE OF WIRE CODE	
LETTER	SIZE
A	#22 AWG
B	#20
C	#18
D	#16
E	#14
F	#12
G	#10
H	#8
J	#6
K	#4
L	#2
M	#1
N	#0
P	#00
Q	#000
R	#0000
T	#28
V	#26
W	#24
X	#19
Y	#30
Z	

COLOR CODE	
NUMBER OR LETTER	COLOR
0	Black
1	Brown
2	Red
3	Orange
4	Yellow
5	Green
6	Blue
7	Violet
8	Gray (Slate)
9	White
a	Clear
b	Tan
c	Pink
d	Maroon
e	Light Green
f	Light Blue



COLLINS RADIO COMPANY